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THE NICHOLS TERRACE

AN IMPROVED CHANNEL-TYPE TERRACE FOR THE SOUTHEAST

THE NICHOLS TERRACE: AN IMPROVED CHANNEL-TYPE TERRACE FOR THE SOUTHEAST

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WHAT TERRACES DO

IN THE SOUTHEAST the more gradual slopes must be cultivated, for there is not sufficient level land to produce the necessary food, feed, and fiber. When rain falls on a cultivated hillside some water evaporates and some soaks into the soil. The remainder runs downhill with a speed that depends upon the steepness of the slope and the resistance to the flow of the water that is caused by vegetation and other barriers. During a rain the volume of water rushing over successively lower portions of a slope is greater and greater because to the rain that falls farther down the slope is added the water that flows down to that point from higher up the hillside. And as the water runs downward it gathers speed. As this continuously enlarging volume of water travels down the slope at an ever-increasing speed, its cutting and carrying power increases. Much soil, and even large clods, may be carried down the slope with the rushing water.

Terraces can be placed across the path of this water. They break the long slope and change the direction of the flow of the water (fig. 1). Each terrace channel forms a waterway that conducts water slowly off the field. This prevents the accumulation of a large volume of rapidly moving water and the consequent loss of a large amount of fertile topsoil.

Terraces do not completely stop the movement of soil. There is considerable soil movement downhill between terraces; but by slowing the speed of run-off water, terrace channels cause the water to drop at least a part of its load of soil particles. The heavier particles drop out first, and though soil movement may not be stopped entirely, most of the soil remains in the field.

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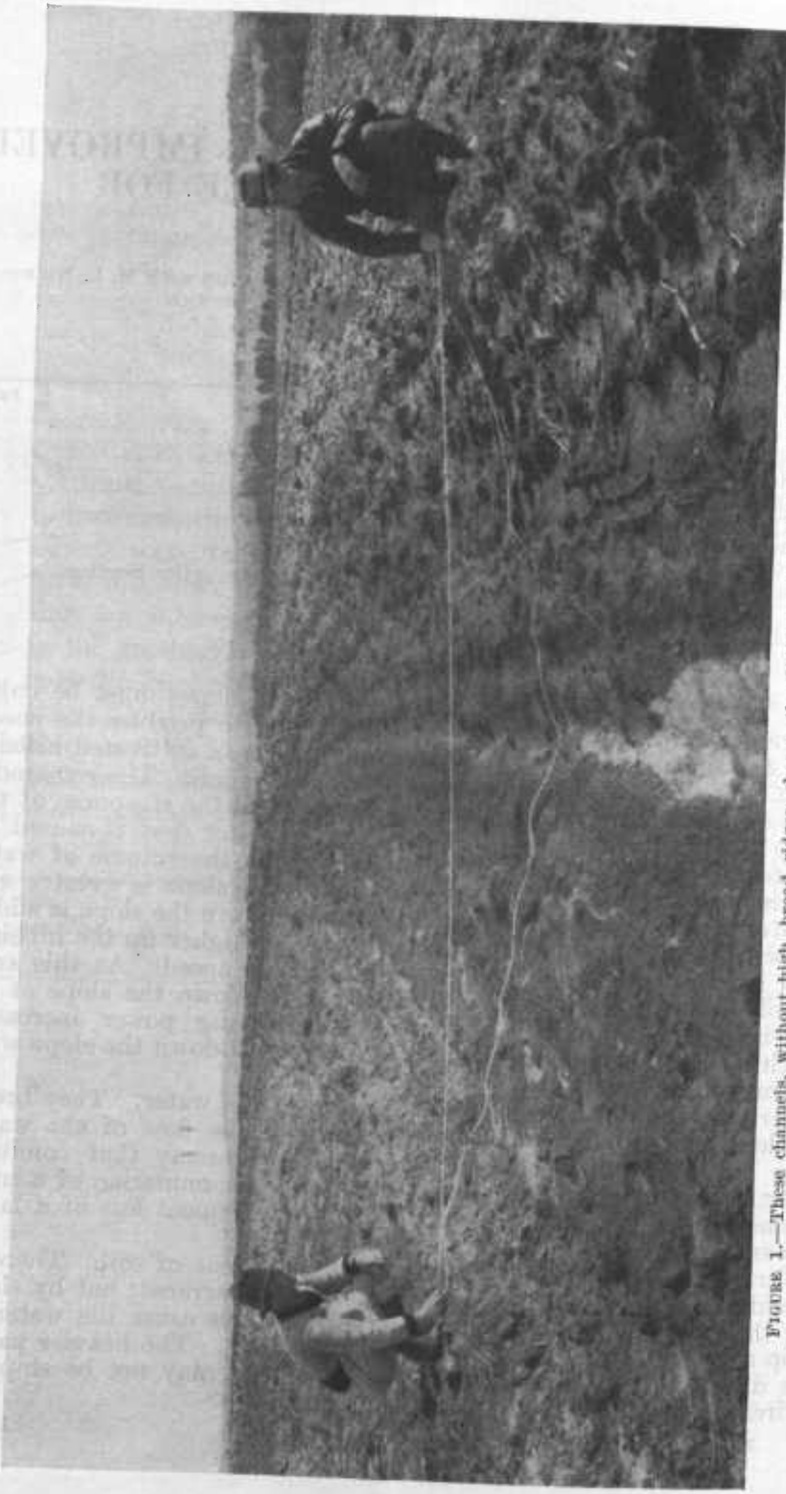

FIGURE 1.—These channels, without high, broad ridges, change the direction and reduce the velocity of run-off water.

Terracing alone does not adequately protect a field against erosion. It is used most effectively as a part of a well-planned program of soil conservation. When combined with contour cultivation, strip cropping, crop rotation, and the use of cover crops, fertilizers, and legumes, these shallow broad-channel terraces make possible soil building at a rate that approaches the rate of soil loss. The terrace channels, developed and maintained by the regular plowing, may be cropped. They offer no serious barrier to any farming practice; in fact, they lay out the fields for the companion practices of strip cropping, contour cultivation, and crop rotation.

THE NICHOLS IMPROVED CHANNEL-TYPE TERRACE

When settlers in the Southeast cleared their slopes they found the soil highly erodible. Almost as fast as the land was broken, gullies began to form, and topsoil was carried away at an alarming rate. These early planters devised crude means for erosion control, which usually failed. Their practices frequently were erosion-inducing rather than soil-conserving. They attempted to control washing

FIGURE 2.—Benches formed on the hillsides as a result of attempts to control erosion.

by excavating hillside ditches and planting narrow strips of vegetation on the contour. As a result, benches formed on the hillsides (fig. 2), gullies cut across them, and finally vast acreages were abandoned (fig. 3).

Efforts to improve these practices resulted in the construction of huge mounds or terraces to halt the water that accumulated on the surface of the soil during the heaviest rains. Although these levee-like mounds have proved successful on the lighter soils of many sections, most farmers do not have sufficient power to build them on the heavier soils. The cost frequently is prohibitive if the levees are made large enough to be safe. Large terrace ridges, thrown up from both the upper and lower sides, often form a pile of all the topsoil

FIGURE 3.—Old benches are well defined in this abandoned field, where they were ineffectual in controlling erosion.

in the field. Since water is dammed up on the upper side of the mound at an elevation higher than the ground surface below the mound, breaks are disastrous.

More recently the Nichols improved terrace has been developed. It is not a terrace in the true sense of the word. It is rather a shallow waterway, which conducts run-off water slowly from cultivated fields. The terrace is built entirely from the upper side. This means that the soil is moved only downhill. The terrace has a shallow, broad channel cut down into the soil or often into the subsoil below the natural level of the field (fig. 4). This broad channel spreads the water and thereby reduces its power to carry away the soil. This overcomes the most serious objection to the old hillside ditch. Since in constructing the terrace only this broad-water channel is made, "windrowing" all or most of the topsoil in the field into a wide, high ridge is not necessary. In constructing a Nichols terrace no effort is made to maintain a distinct terrace ridge. The ridge is blended into the slope after the field is worked. As one looks up

the slope the terraces are scarcely visible (fig. 5). An abrupt drop is not left on the downhill side when this terrace is fully constructed, as it is when the mound-type terrace is used.

When supplemented by a small ridge on the lower side of the channel, the terrace can be developed gradually with reasonably satisfactory results. Each plowing operation deepens and broadens the channel. Thus this system of terracing fits into the farming operations. Heavy rains may cause the water channel to overflow, but serious damage is less likely to occur with the channel type (fig. 6) than with the ridge-type terrace as the former continues to function during overflow and thus reduces the volume that overtops. Frequent overtopping is dangerous with any type of terracing because of the resultant concentration of run-off, which causes gullying

FIGURE 4.—The channel is cut into the subsoil.

between terraces, silt deposition, and overtaxing of the terrace channels below. For most satisfactory results the channel must have sufficient capacity to reduce overtopping to a minimum.

The Nichols terrace cannot be used successfully on slopes greater than 12 to 15 percent. On certain soils this terrace is effective only on slopes somewhat less than 12 percent. Whether a slope is too steep to be terraced depends in part on the cropping system employed, the soil type, the skill with which the terrace is made, and the care used in its maintenance. The Nichols terrace has been found by experience to be suitable for all slopes and soil types in the Southeast that should be terraced.

HOW TO BUILD A NICHOLS TERRACE

THE USE OF LARGE POWER UNITS

After a field has been planned and the lines run in accordance with the spacings and grades shown in tables 1 and 2 respectively, the Nichols improved-type terrace can be constructed more easily

FIGURE 5.—The terraces are scarcely visible as one looks up the slope.

and economically than any other type. Figure 7 shows progressive steps in the construction of a terrace. Large power units are recommended for the construction of the Nichols terrace (fig. 8) as it has

FIGURE 6.—If the broad channel overflows, little damage results. There is no ridge to break.

been found advisable to move enough earth in the first operation to put the field in such condition that the farmer can cultivate and maintain the terraces as a part of the regular cropping system. To do this it is usually necessary to make only six or eight through trips or three or four round trips per terrace with a standard 35- to 40-horsepower terracing unit. Large power units have proved very economical for the construction of terraces.

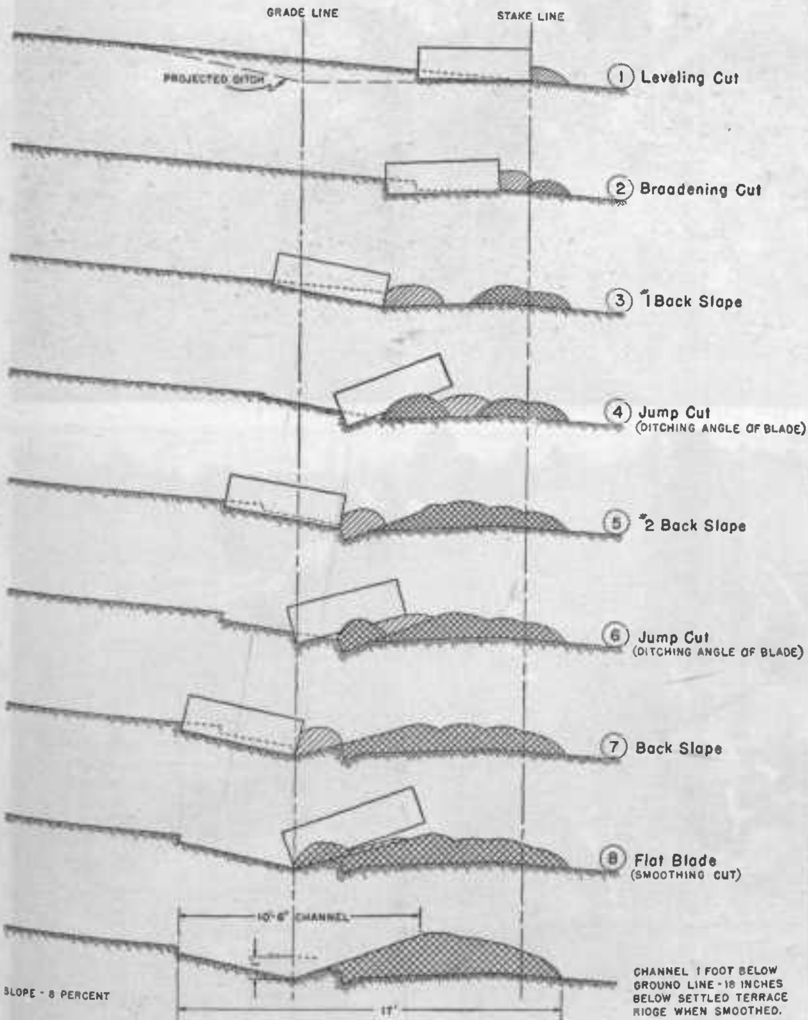

FIGURE 7.—This diagram shows the progressive steps in the construction of the improved Nichols channel-type terrace.

FIGURE 8.—Large power units are recommended for construction of the improved Nichols terrace.

TABLE 1.—*A guide for determining the vertical and horizontal distances between terraces based on the land slope* [1]

Slope of land per 100 feet (feet)	Vertical distance or the drop between terraces	Horizontal distance between terraces	Slope of land per 100 feet (feet)	Vertical distance or the drop between terraces	Horizontal distance between terraces	Slope of land per 100 feet (feet)	Vertical distance or the drop between terraces	Horizontal distance between terraces
	Ft. In.	*Ft.*		*Ft. In.*	*Ft.*		*Ft. In.*	*Ft.*
1	2 6	180	5	3 6	75	9	4 6	50
2	2 9	140	6	3 9	63	10	4 9	48
3	3 0	100	7	4 0	57	12½	5 4	43
4	3 3	80	8	4 3	53	15	6 4	40

[1] After the slope of a hill has been determined, select from this table either the vertical or horizontal distance that will apply to the slope determined. By use of the level and rod, locate the terrace on the hill or pace down the hill the required horizontal distance. The latter method is the quicker and easier.

Data from the agricultural experiment station of the Alabama Polytechnic Institute, Auburn, Ala.

TABLE 2.—*A guide for determining the terrace grade based on the slope of land and length of terrace* [1]

Terrace length (feet)	Clay subsoil			Sandy subsoil		
	Maximum fall per 100 feet in terrace on land slope of—			Maximum fall per 100 feet in terrace on land slope of—		
	5 percent	10 percent	15 percent	5 percent	10 percent	15 percent
	Inches	*Inches*	*Inches*	*Inches*	*Inches*	*Inches*
0 to 100	0	0	0	0	0	0
100 to 400	1	1¼	1½	¼	½	¾
400 to 700	2	2½	2¾	¾	1¼	1½
700 to 1,000	3	3½	4	1¼	1¾	2½
1,000 to 1,300	4	4¾	5	1½	2½	3¼
1,300 to 1,600	5	----	----	2	3	4

[1] Data from the agricultural experiment station of the Alabama Polytechnic Institute, Auburn, Ala.

As has been stated, terrace channels need not be built to full size in the first operation. They can be built progressively until the water-holding capacity of the channel is as great as is desired. In order to determine the water-holding capacity of a terrace channel it is necessary to find the area of a cross section of the channel. This area multiplied by the length of the channel will give the number of cubic feet of water that the channel will hold. If the completed channel is to be of sufficient size, the area of the channel cross section must be at least 6 to 7 square feet. This minimum is the measurement of the cross-sectional area beneath the maximum water-surface level. Although the water-holding capacity of the channel will not be great enough until the channel cross section reaches this minimum area of 6 to 7 square feet, the terrace will be of benefit during the time when the channel is being progressively developed to this size.

The size of the channel at first appears to be greater than it is because the loose earth on newly constructed terrace ridges will settle and gradually scatter down the slope. But proper maintenance as part of the regular plowing enlarges the broad, shallow channels until they become sufficiently large to convey all the run-off water slowly from the field.

THE USE OF FARM POWER

Farmers who have large mule teams or tractors may do their own terracing. On lighter sandy soils farmers have built terraces of all types very satisfactorily with small mule teams. On these soils the channels can be built progressively with mule power and home-made or commercially built drags and plows by simply plowing on desired grades. Figure 9 shows a channel constructed in this way. The channel-type terrace, because it suffers less from breaks, is proving most satisfactory for the "delayed" or "progressive" method of building. Some farmers prefer first to make temporary mounds, as

FIGURE 9.—The channel of this terrace was built progressively by plowing on desired grades.

is done when a Mangum terrace is built, and then to develop the terrace by plowing out the channels as the field is broken once or twice a year for crops.

On heavier soils, terracing with light mules or horses is very difficult if either a large mound or an adequate channel is to be completed at once. Experience in the Southeast during the last 20 years has led to the conclusion that building the Mangum or mound-type terraces with small units on the heavier soils is not generally successful.

Extensive use of vegetation aids in erosion control during the early stages of terrace construction with farm power. If a heavy cover of vegetation is turned under each time the terraces are plowed the soil is enriched and made less erodible.

MAINTENANCE OF THE NICHOLS TERRACE

Maintaining the improved Nichols terrace requires very little more work than caring for an unterraced field. Figure 10 shows the channel after it has been plowed out in both directions as part of the regular plowing operations. In the Southeast where more than one crop is produced in a field during a year, the channel may be plowed out twice each year. This is very desirable during the early

FIGURE 10.—Maintaining the improved Nichols terrace requires very little more work than is required in the regular plowing of a field.

period of the development of the channel. For the first 2 or 3 years after the channel has been built one extra plowing each year rapidly develops a very satisfactory and adequate waterway.

A PART OF FARM OPERATIONS

The Nichols improved terraces make a system of broad, shallow intercepting waterways that carry run-off water slowly from cultivated fields. They are simply an important part of a soil-conserving system of farming on gradual to moderate slopes. The broad, shallow channels are developed and maintained as an essential part of regular farming operations and, when completed, facilitate rather than hamper the continued application of soil-conservation practices. The wide, shallow ditches are well adapted to the use of modern farm equipment (fig. 11).

FIGURE 11.—The wide, shallow ditches are well adapted to the use of modern farm equipment. The white cord (at left) shows the slight depth of this terrace channel. The 10-foot measuring pole to its right gives some indication of its width.

EROSION-CONTROL DEMONSTRATION AREAS, REGION 2, SOIL CONSERVATION SERVICE

VIRGINIA

Bannister and Sandy Rivers, Danville
Appomattox area, Lynchburg
Ivy Creek area, Charlottesville

NORTH CAROLINA

Deep River, High Point
Brown Creek, Wadesboro
Reedy Creek, Greensboro
Stony Creek, Burlington
Buffalo, Franklinton
Madison, Reidsville
Huntersville, Charlotte
Arcadia, Lexington

SOUTH CAROLINA

South Tyger River, Spartanburg
Fishing Creek, Rock Hill
Little Beaver Dam Creek, Anderson
Bush River, Newberry
Camp and Gills Creeks, Lancaster

GEORGIA

Sandy Creek, Athens
Muckalee Creek, Americus
Agate, Rome
Little River, Gainesville
Cannonsville, LaGrange

FLORIDA

Graceville, Graceville

ALABAMA

Buck and Sandy Creeks, Dadeville
Greenville, Greenville
Anniston, Anniston

MISSISSIPPI

Okatibbee River, Meridian
Bear Creek, Canton
Oakey Woods Creek, Laurel
Bakers Creek, Port Gibson
Town and Spring Creeks, West Point

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